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ABSTRACT
                With the assistance of learning technology consultants in
the Technology Teaching and Learning Center (TTLC) at the University of
Houston-Downtown (Texas), professors have shifted their paradigms and are
taking the leap to use more high-risk World Wide Web technologies in their
courses. One that has become a hallmark is delivering exams via the Internet.
With advanced authoring tools such as Asymetrix ToolBook II Instructor,
students can take tests on computer workstations inside computer labs within
their university, at distant education sites, or at home. This paper
discusses: (1) planning and preparation, including software selection,
training, and time management; (2) risks related to question widgets,
question scoring, Java class files, exam scoring, and Web browser components;
and (3) high-risk precautions, including security issues and back-up plans.
Three figures present the Java class location, student log-in, and a
scoring/tracking screen. (Author/AEF)

Improving Learning Processes in Institutions of Higher Education
By Incorporating High-Risk Web Technologies

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Abstract: Just as technology trends improve and we approach the next millenium, so have our abilities to perceive farther and visualize new methods of testing. With the assistance of learning technology consultants in the Technology Teaching and Learning Center (TTLC) at University of Houston-Downtown, professors have shifted their paradigms and are taking the leap to use more high-risk web technologies in their courses. One that has become an instant hallmark is delivering exams via the Internet.

1. Introduction

A new state of consciousness has taken form – the reality that learning can take place outside the confines of a classroom. This is not meant only in terms of the ever-evolving distance learning and video conferencing, but also by using web technologies as a supplement.

In one of the nation's most diverse institutions of higher education, the University of Houston-Downtown (UHD) in Houston, Texas, students are grasping ideas and concepts through non-traditional teaching methods. For example, faculty members incorporate electronic mail, listservs, and World Wide Web home pages into their classes to provide more innovative ways of delivering instruction. Professors have the opportunity to incorporate the latest computer technologies into their courses with the assistance of learning technology consultants like us who work inside the UHD Technology Teaching and Learning Center (TTLC). The TTLC provides resources and support for the university community to explore new technologies and capitalize on their potential to improve learning. It offers a wide range of programs, tools, and activities that enhance the education and opportunities available to the diverse student body of this dynamic university. By including such learning facets, students are ready to venture into the "real world" being more confident, prepared, and capable of using technology. They are ready to surpass their competitors and end up on top.

Just as technology trends improve and we approach the next millenium, so have our abilities to perceive farther and visualize new methods of delivering instruction. With this in mind, professors at UHD have shifted their paradigms and are taking the leap to utilize more high-risk web technologies in their courses. One that is becoming an instant hallmark is delivering exams via the Internet.

The development of authoring tools such as Asymetrix's ToolBook II Instructor enables more professors to break the barriers of test taking. With advanced programs such as this, students can take tests on computer workstations inside computer labs within their university, at distant educational sites, or at home.

2. Planning and Preparation

Throughout the 1997-98 school year at UHD, faculty members took the leap of developing online exams to be delivered via the Internet as a supplemental method of giving examinations during instructional television (ITV) courses. A great deal of planning and preparation took suit before the initial test taking, but ultimately the exams were successfully administered and conducted.

After assessment of the current software titles available in the TTLC, Asymetrix's ToolBook II Instructor 5.01 was the software of choice.

ToolBook II Instructor is a high-end authoring tool designed for the flexible creation of content-rich online learning applications. Its wide array of tools and predefined content includes wizards, widgets, and templates. It comes with a catalog full of preprogrammed interactive objects that can be dragged and dropped into applications. The authoring tools provide for a range of distribution options that are sure to meet many users needs. Because it was necessary to deploy over the Internet, we decided to use the HTML & Java export option built into the ToolBook II authoring environment.

Using the ToolBook II "Export for Web" feature, the online exam was converted directly to an Internet-ready format (a combination of HTML and Java) for delivery on the World Wide Web. Anyone with Internet access, a web browser, and Uniform Resource Locator (URL) of the exam can take the test without having to install a plug-in.

After determining the software application to use, we (the technology consultants) then had to provide training for the faculty members. This involved familiarizing the professors with the information needed to create a ToolBook II Instructor Book (examination), which includes learning how to add:

- ❖ a title page
- ❖ duplicate pages
- ❖ text fields
- ❖ question widgets

- ❖ navigation widgets
- ❖ an exam summary page
- ❖ a scoring button

In addition, time management was very important in the development of the online examinations. Given that faculty members participate in a number of activities including teaching courses and attending conferences, we wanted to make sure they learned the skills necessary to build successful exams. As technology consultants, it is our responsibility to train the faculty specifically on a need-to-know basis. This included providing one-on-one hands-on training, detailed documentation, and constant support.

3. The Components and Risks

During the online exam development process, there were a number of unexpected factors discovered. These factors are what allowed us to learn that online testing is indeed a high-risk web technology.

3.1 Question Widgets

All of the ToolBook II Instructor 5.01 question widgets are created from ToolBook II objects. Many, particularly multiple-choice question widgets, consist of groups of objects in fours. The question widget behavior is specified using scripts. If a question widget's default does not meet the needs of your application, you can customize it. The question widget in the Standard Widget Catalog are constructed from standard ToolBook II objects, so you can modify them easily if you are comfortable with OpenScript programming. However, the question widgets in the Internet Widget Catalog are implemented not with OpenScript, but with Java. These question widgets can not be modified in the same way the standard question widgets are modified. This proved to be a problem with high-risks involved. For instance, if a professor has a multiple-choice test with five answers rather than four, the question widgets (which are pre-programmed with four options) would need to be modified using scripting that the professor may not have time to learn.

3.2 Question Scoring

In one instance, we actually created an exam with 50 questions using a question widget with four choices. We manually duplicated one of the choices before setting the question properties for each question. So, instead of having only options a, b, c, and d, we had a, b, c, d, and e. After setting the scoring properties for each question widget and exporting the test as HTML, we were faced with the problem of answer e being scored correctly even if the correct answer was defined as a, b, c, or d in the scoring properties. This was discovered when we took the exam and selected e as the answer for each question for testing purposes. We found that a solution would be to create the test with four multiple-

choice questions. This allowed us to avoid working with any scripting and gave us time to focus on the exam development.

3.3 Java Class Files

Before the exams could run effectively, ToolBook II Java classes needed to be downloaded from the Asymetrix web site (http://www.asymetrix.com) and then installed in a designated area on the web server where the exam would be located. If an exam were accessed during a time when the necessary Java class files were not installed on the server, then the test would not function properly.
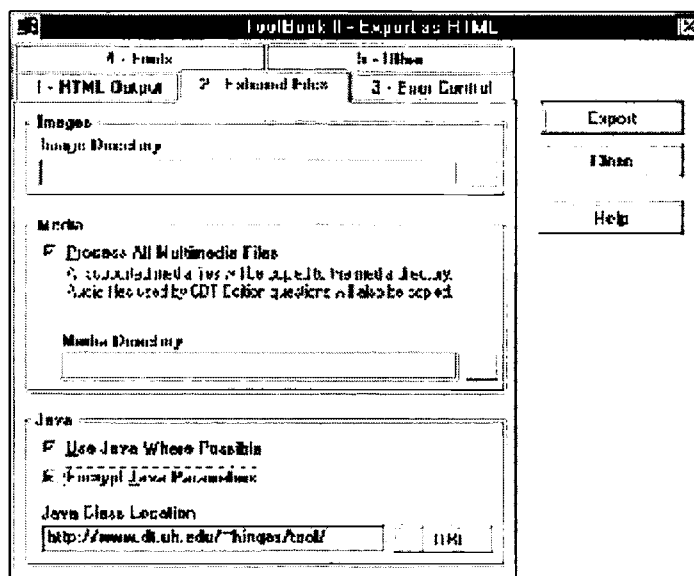

Figure 1: Screen view of the window one must access in ToolBook II Instructor 5.01 in order to indicate the Java Class Location.

3.4 Scoring the Exam

Scoring properties were setup for the examinations. This was configured in the Instructor's Book Properties. When these settings were defined correctly, it allowed for the scores to be sent to the student. When the student entered the exam, he or she was prompted with the login window to enter the correct name and email address in order to receive the score.
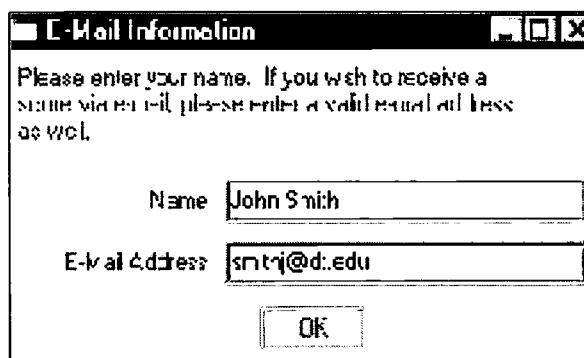

Figure 2: Screen view of the window students must fill out so they may receive their scores and so the instructor will know is taking the examination.

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In the Instructor Book properties, there is also an option to send a log to the professor so that he or she can find out more information, like the computer machine name from which the student took the exam. This is excellent information to have for security purposes.
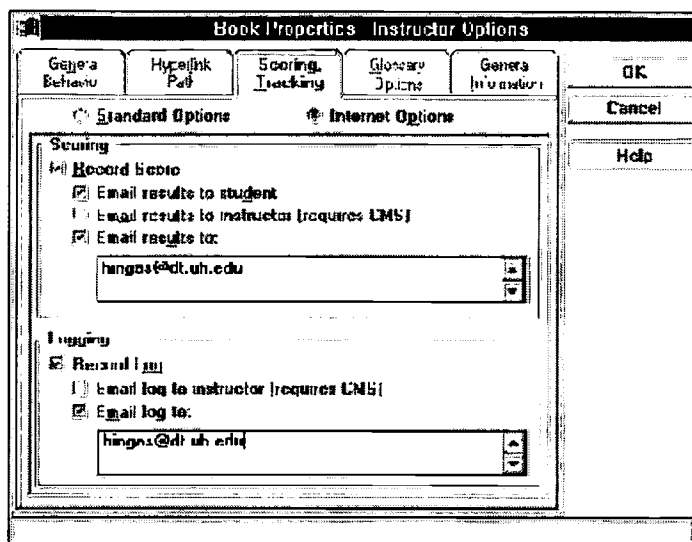
Figure 3: Screen view of the Scoring, Tracking window in the Instructor Book Properties.

During an actual examination we discovered that some student logs were not emailed to the professor. Though tested continuously, we were still unable to determine the reason why they were not received.

3.5 Web Browser

Before deploying the exams over the Internet, it was important to know what computer software the students enrolled in the courses had access to at their locations. The ToolBook II Instructor 5.01 requirements specify that tests should be accessed using the Netscape Navigator Gold 3.01 web browser. Through trail and error, we discovered that exams could occasionally be accessed using a lower or higher version of the Netscape browser. However, during the actual testing situation we required that students access the exams using Netscape Navigator Gold 3.01.

4. High-Risk Precautions

4.1 Security Issues

Before and during the examinations, security was an important issue. The security precautions we took included setting restrictions on the time students could access the exams and having a proctor available at distant locations during the tests to verify that the students taking the test were actually registered in the course. In addition, we set up restrictions which enforced students to provided usernames and passwords before entering the online examination web pages.

4.2 Back-up Plan

When setting up online exams it's also important for the instructor to have a back-up plan in case the technology fails. We prepared for this by instructing the students to bring scan-trons on the exam date and enter their answers on them as they selected their answers on the computer. Also, it was important to have more computers ready than students registered in the class in case one or more computers experienced technical difficulties during the examination.

5. Conclusion

By including such a high-risk web technology as online testing into courses, professors are able to evaluate the effectiveness of incorporating this type of testing in their distance learning courses and in turn recommend this use of the technology to other faculty members. In our organization, we learned that the professors as well as the university and technology department benefit in this process. By addressing and accessing the online testing issue through the development of tests created with such products as Asymetrix ToolBook II Instructor, individuals see that the worth is invaluable to the entire university from the administration to the students.

6. References

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